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Published in:
Linear Algebra and Its Applications

Publication date:
2005

Document Version
Publisher's PDF, also known as Version of record

Link to publication from Aalborg University

Citation for published version (APA):
Jørgensen, L. K. (2005). Rank of adjacency matrices of directed (strongly) regular graphs. *Linear Algebra and Its Applications*, *407*, 233-241.

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Rank of adjancency matrices of directed (strongly) regular graphs

Abstract: For a positive integer r we consider the set B_r of all values of $\frac{k}{n}$ for which there exists an $n \times n$ matrix with entries 0 and 1 such that each row and each column has exactly k 1's and the matrix has rank r. We prove that the set B_r is finite, for every r.

If there exists a k-regular directed graph on n vertices such that its adjacency matrix has rank r then $\frac{k}{n} \in B_r$. We use this to exclude existence of directed strongly regular graphs for infinitely many feasible parameter sets.